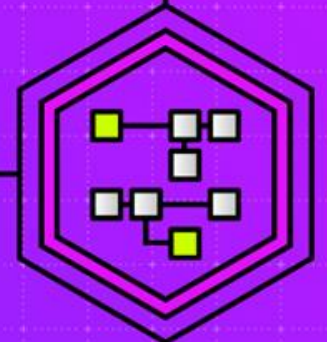
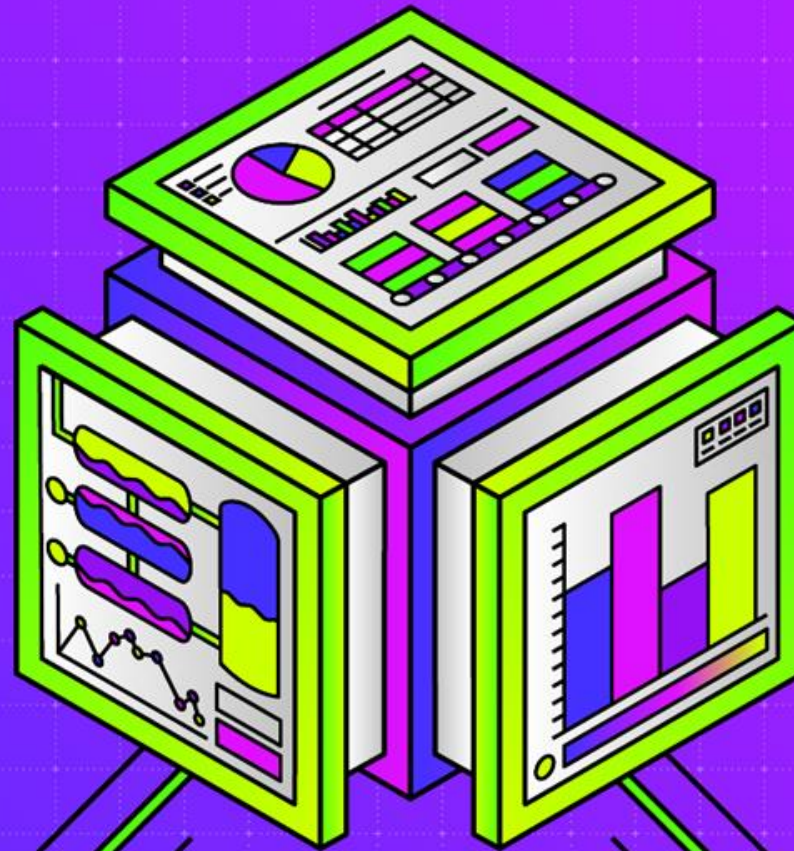


Design Like a Pro: Exceptional Industry-Specific HMI



Presenters



Kent Melville

*Director of Sales Engineering
Inductive Automation*



Mara Pillott

*Application Engineering Manager
Inductive Automation*

Guest Presenters



Alex Marcy

*Founder and CEO
Corso Systems*



Frank Peronace

*Controls Manager
Kupper Engineering*



Chris Monchinski

*VP of Manufacturing Intelligence
Automated Control Concepts*

Ignition!

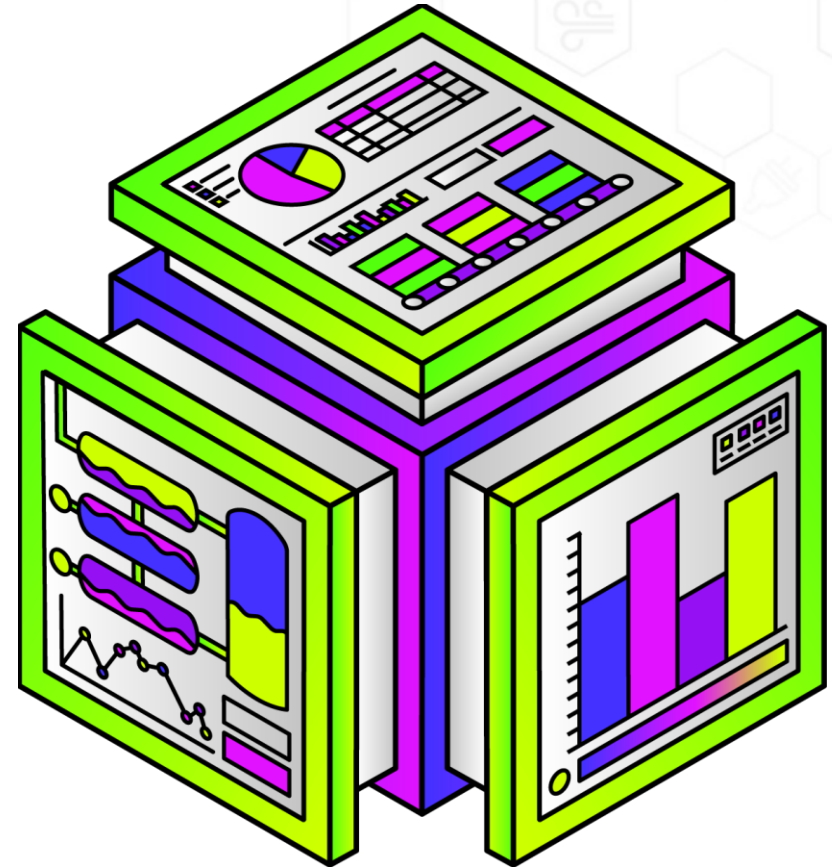
by inductive automation

**The Unlimited Platform for
SCADA and So Much More**

- **Connect, Design, Deploy Without Limits:**
 - One central hub for everything on the plant floor
 - Create any kind of industrial application
 - Web-deploy clients to desktops, industrial displays & mobile devices
- **Unlimited licensing**
- **Industrial-strength security and stability**
- **Trusted by thousands of companies worldwide**

Agenda

- **Cross-Industry “Building Blocks”**
- **Real-World HMI Examples**
- **Audience Q&A**



Cross-Industry “Building Blocks”

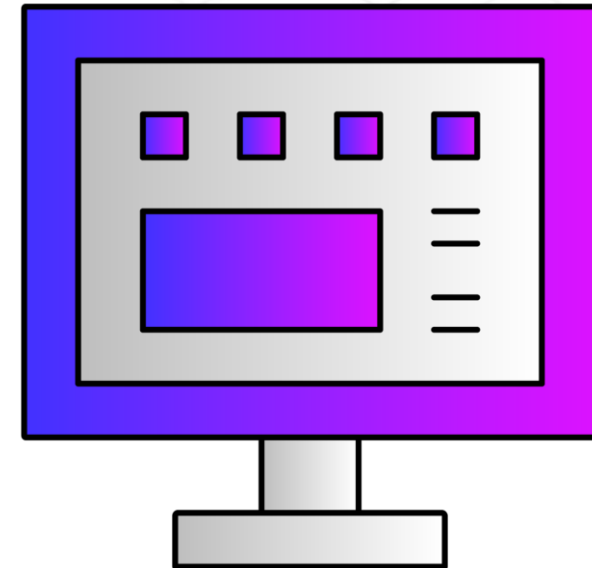
General Design Concepts

- Navigation Structure
- Reusability
- High-Performance HMI Techniques
- Alarm Management
- Responsiveness

Navigation

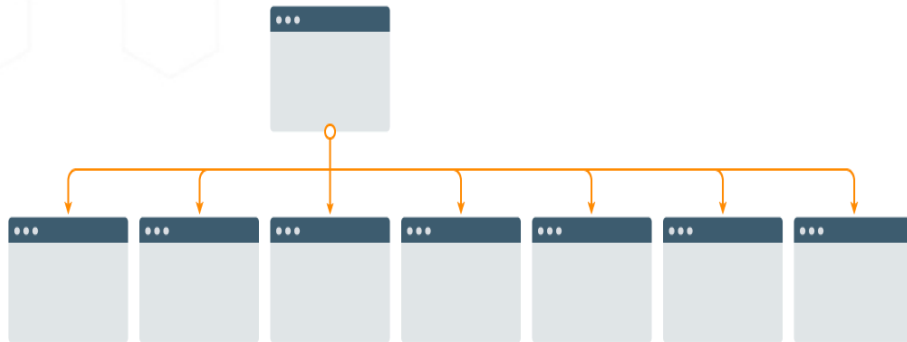
Navigation

- Strategy
- Layout
- Limiting Clicks

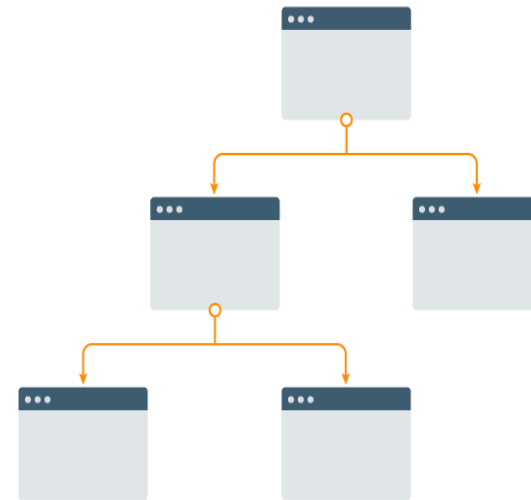


Determine Your Navigation Structure

Broad and Shallow



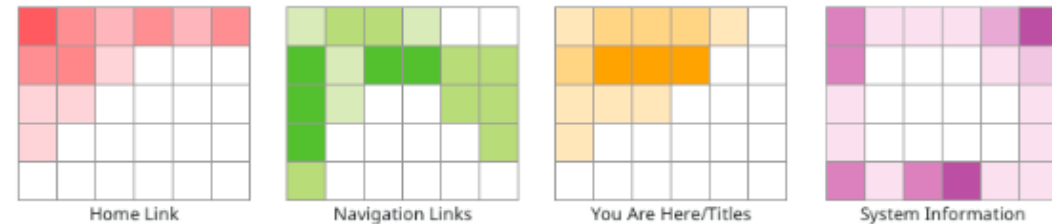
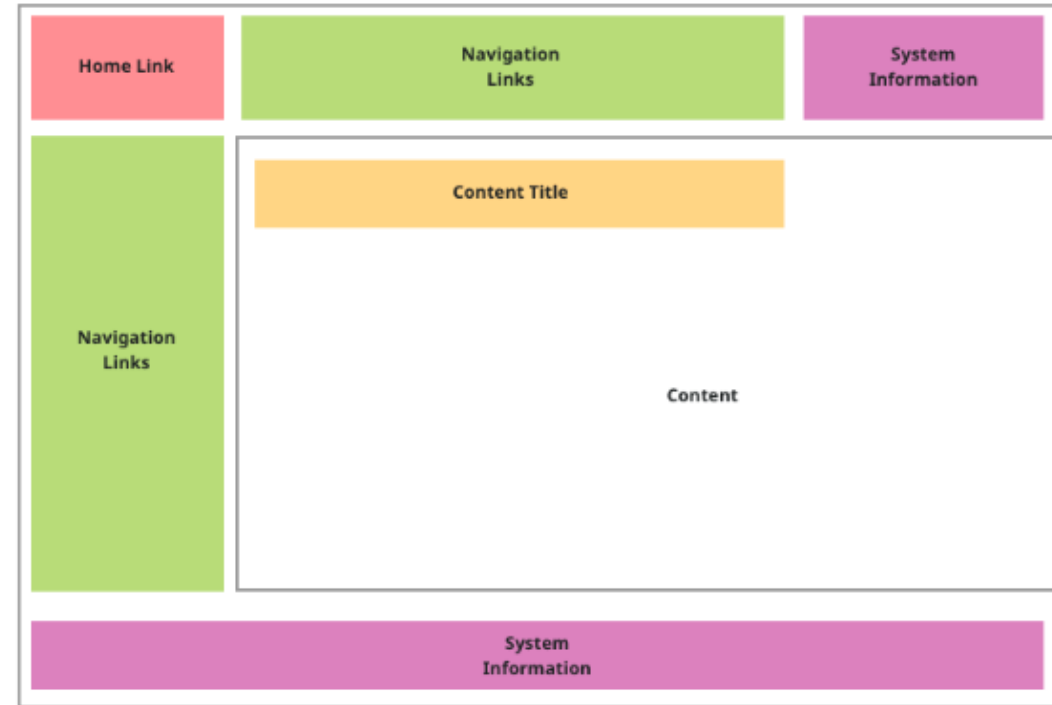
Narrow and Deep



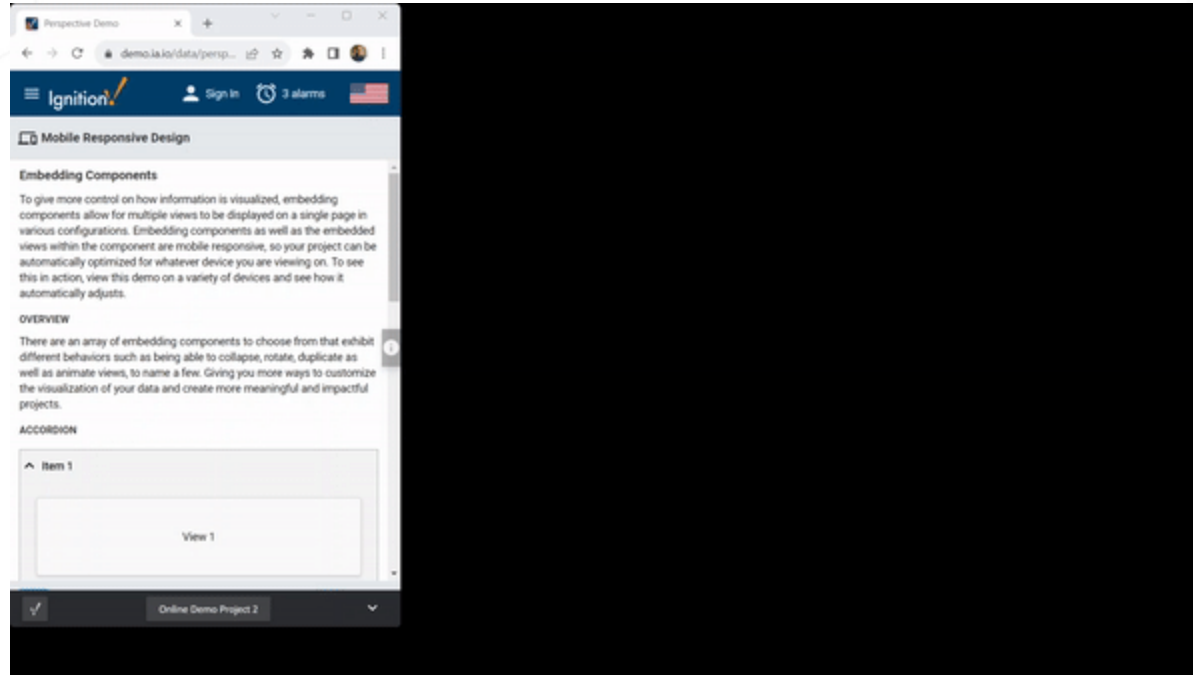
Determine Your Navigation Layout

Screen layout

- Primary Top Header
- Secondary Top Header
- Side Navigation
- Tabs



Mobile-Responsive Navigation



Reusability

Why Reusable Objects?

- Saves development time
- Save maintenance time
- Consistent

Reusable Objects

- Projects
- UDTs
- Templated Views

Reusability: Projects

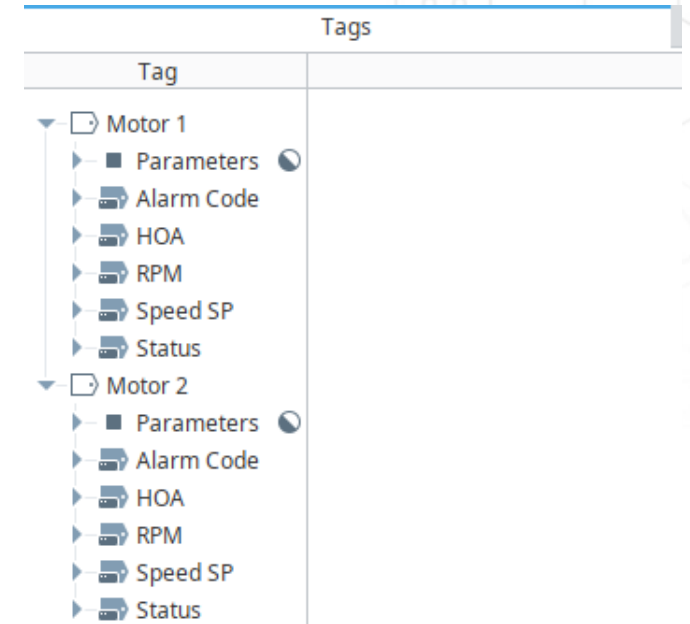
Project Inheritance

- Consistency
- Shared Resources
- Global Project
- Multi Level

Reusability: UDTs

User Defined Types (UDTs)

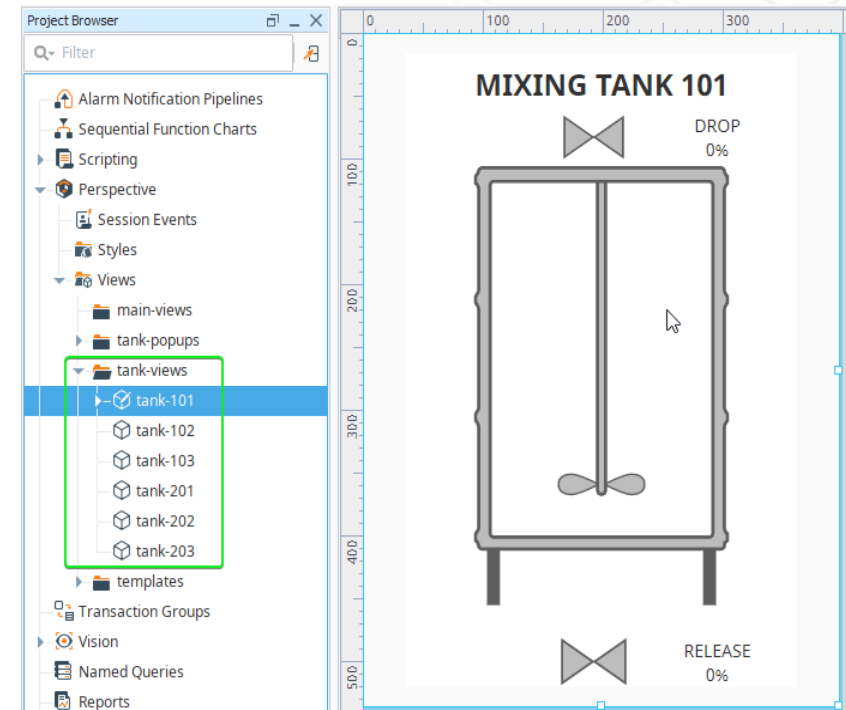
- Group of tags and properties representing an object,
- UDTs ensure consistent structure.
- Tag addresses can be parameterized and multiple UDT instances can be created with just a few clicks.
- Reusable views or templates can easily be built from a UDT.
- Modifications to structure on a UDT can be made on the definition and changes apply to all instances automatically.
No more repetitive copy/paste!



Reusability: Templated Views

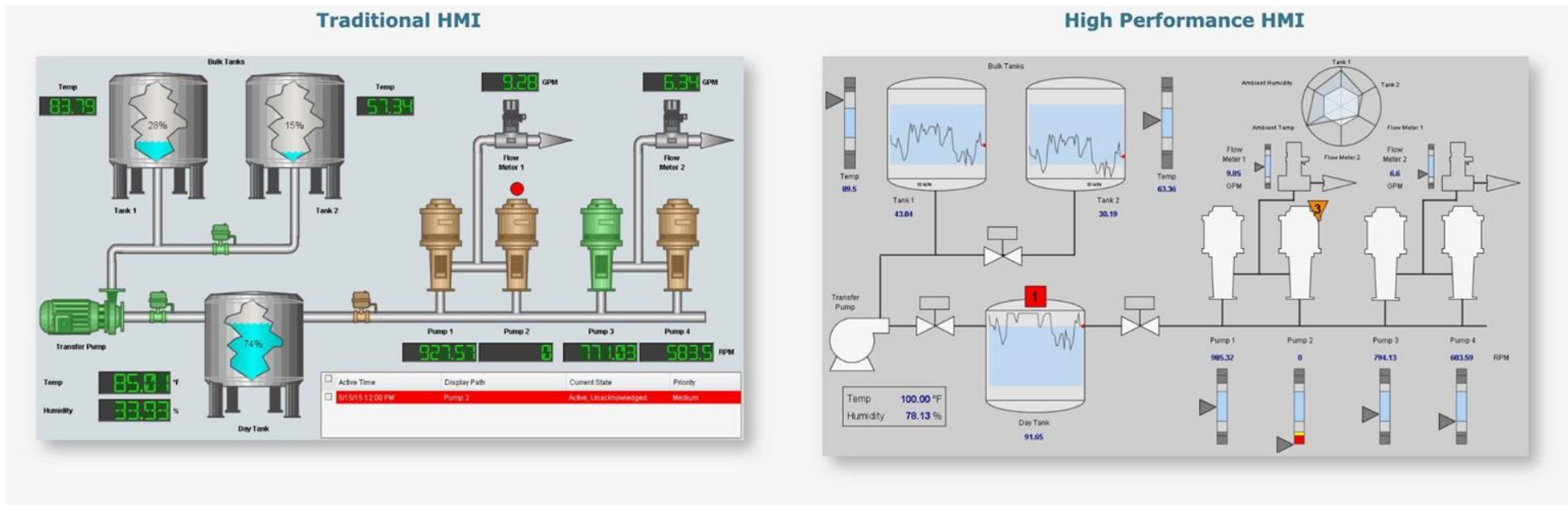
Reusing Views

- Create once - use over and over
- Maintain in one place
- Use anywhere in your project:
 - Main view
 - Popup
 - Embedded view
 - Flex Repeaters



High-Performance HMI

- Color and Indicators
- Analog vs Digital
- Data with context
- Sparklines



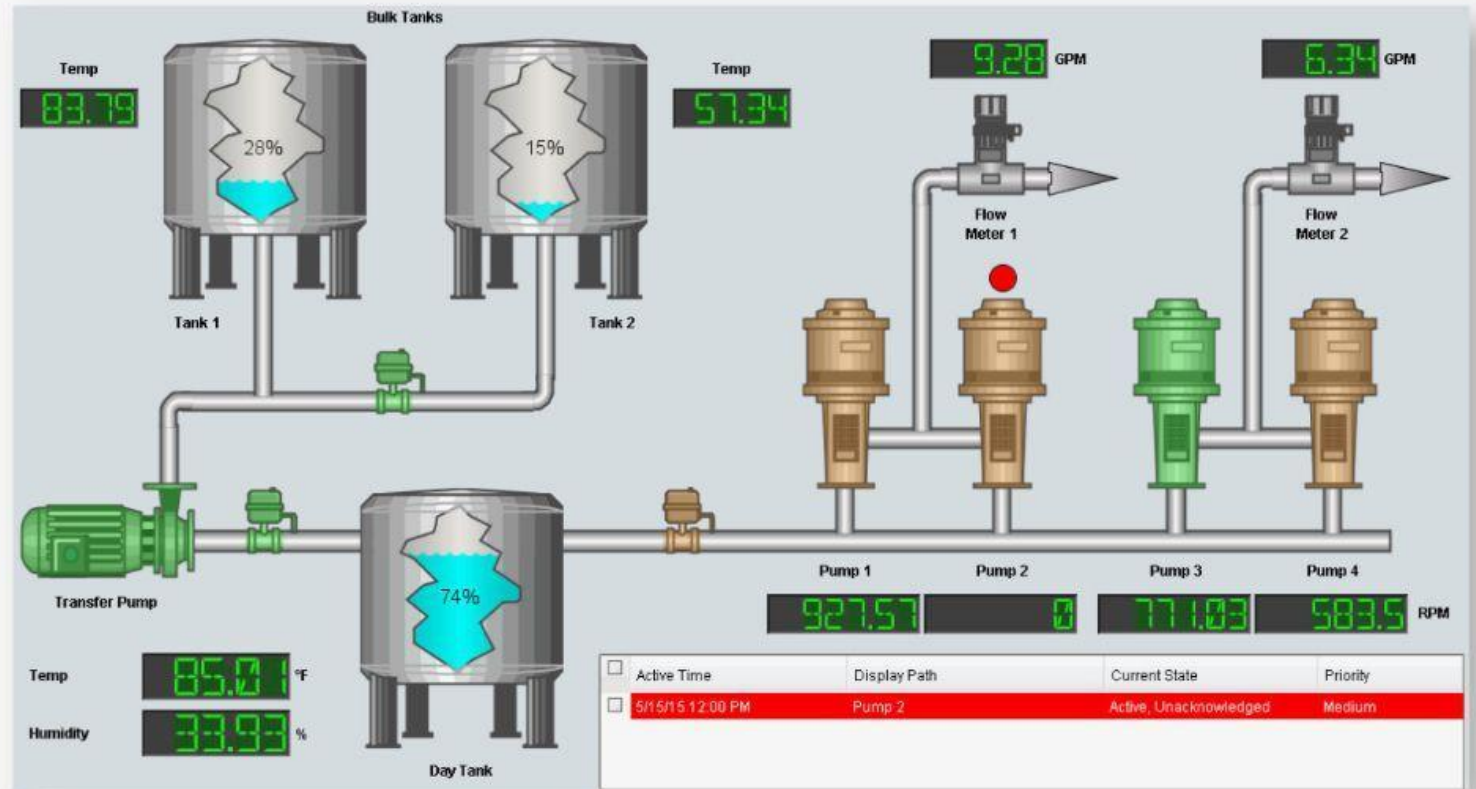
High-Performance HMI: Color and Indicators

- Color where attention is needed.

VS

- Color everywhere

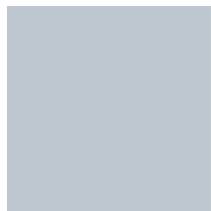
Traditional HMI



High-Performance HMI: Color

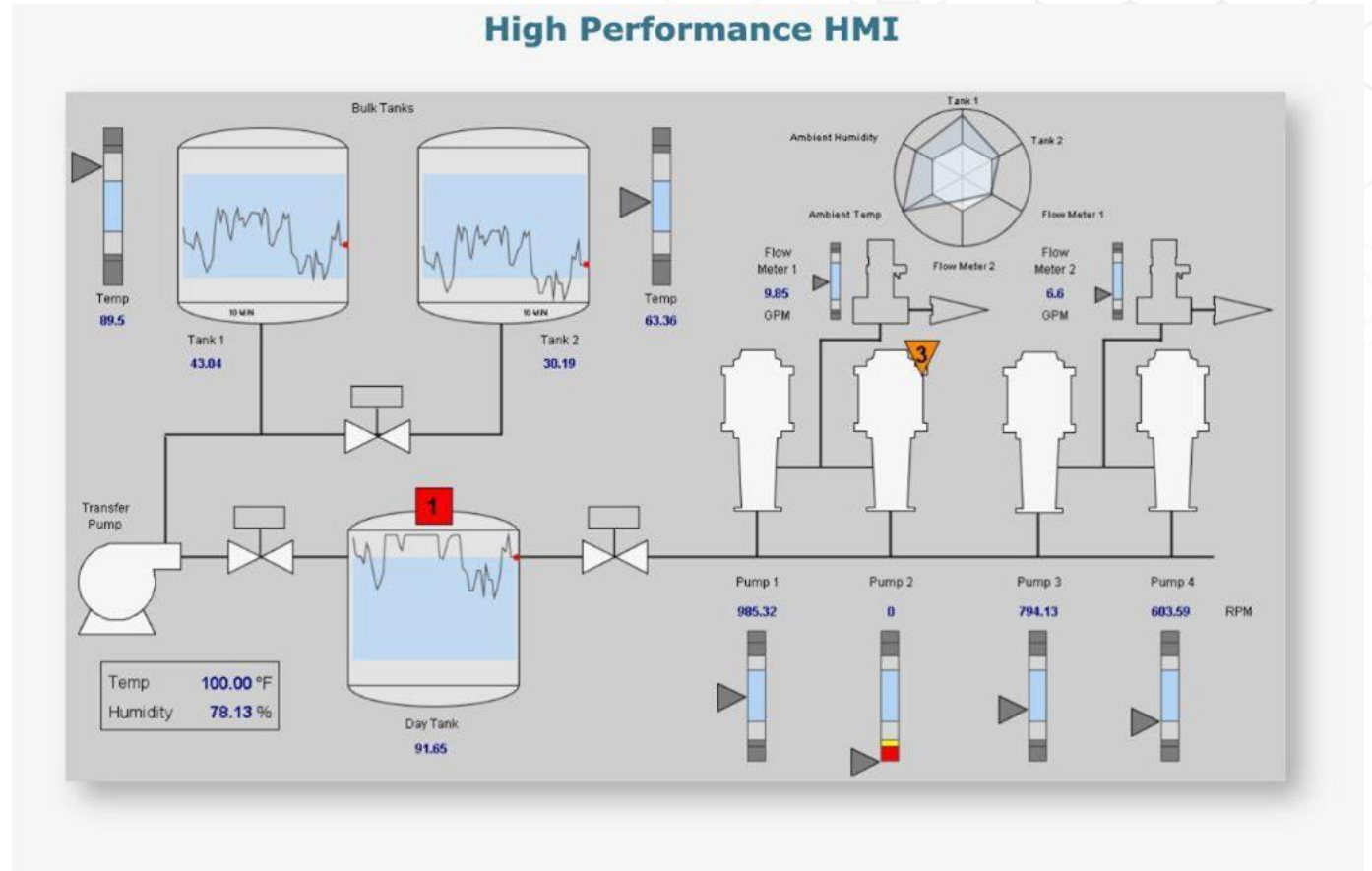
Color

Which square stands out?



High-Performance HMI: Color and Indicators

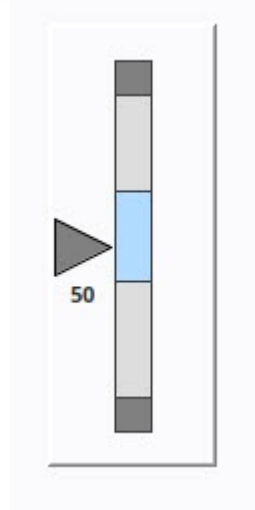
- Color where attention is needed.
- Numeric indicators and shapes for priority



High-Performance HMI: Analog vs Digital

Moving analog indicators

- Displays an analog value as an arrow pointing at a bar with segments showing the desired operating range



Digital Display

- Displays a value without meaning. Desired range is unknown.



High-Performance HMI: Data with Context

Example: Blood Pressure Reading

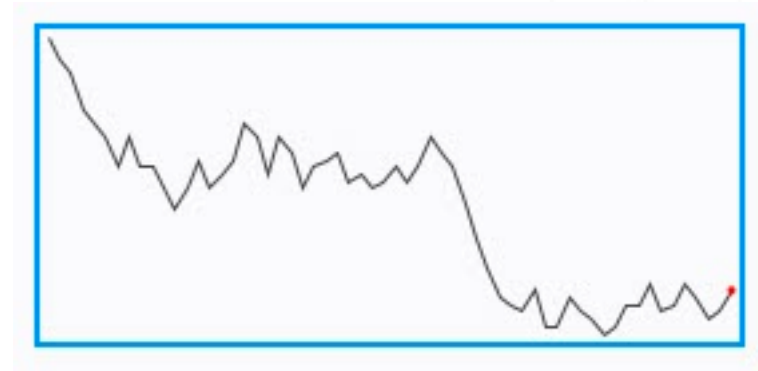
Blood Pressure: 122/93

	Systolic	Diastolic
Normal		
Pre-Hypertension	122	
High Blood Pressure Stage 1		93
High Blood Pressure Stage 2		
Hypertensive Crisis		

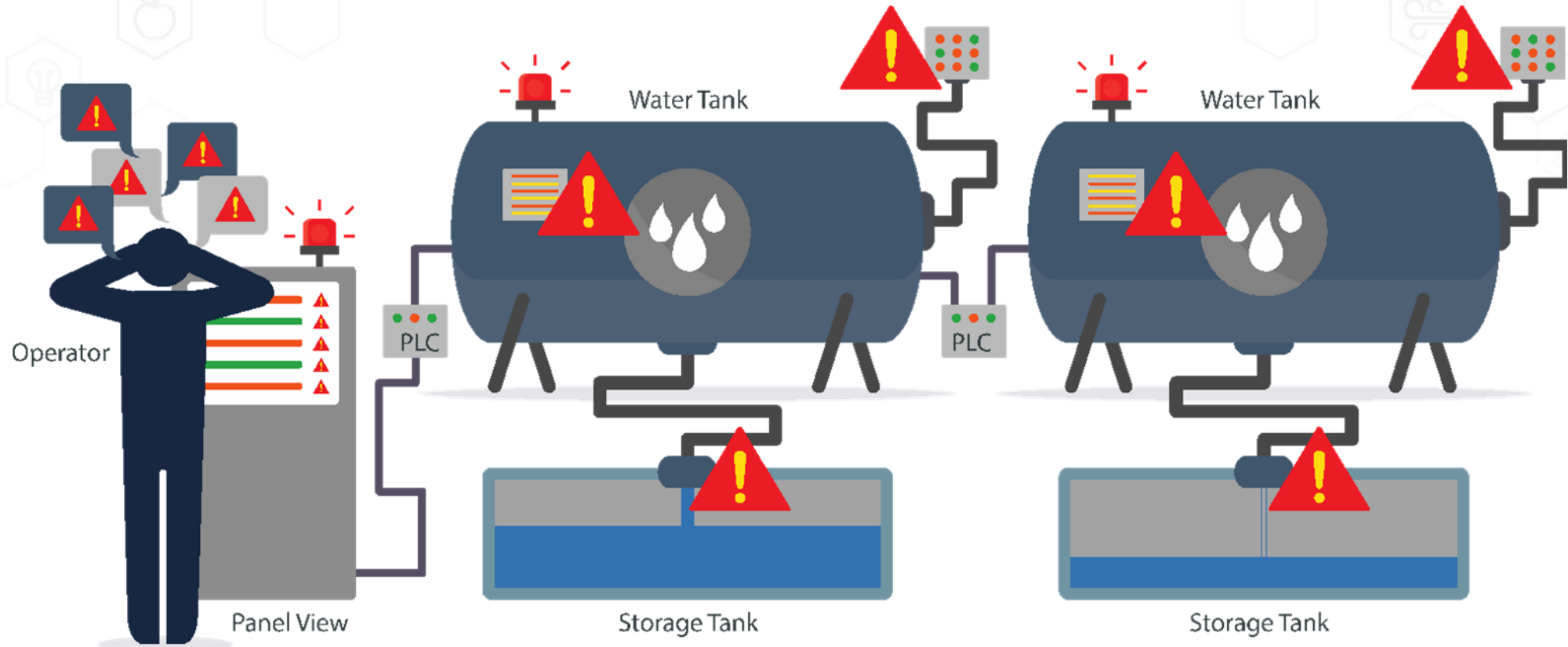
High-Performance HMI: Sparkline

Sparklines

- Minimalistic chart component that displays a line-chart history for a single datapoint
- Show contextual information in a very small amount of space
- Typically used to display the recent history to quickly discern the recent trend



A Poorly Managed Alarm System



Manage Your Alarms

Use Hierarchy to Filter Alarms for Operators



Prioritize Your Alarms

Priority Levels:

- Set most alarms at a lower priority
- Set alarms that do not require a response as Diagnostic

0	Diagnostic
1	Low
2	Medium
3	High
4	CRITICAL

Consolidate Alarms

Reduce the Number of Alarms

- Avoid alarm floods by consolidating multiple alarms into a single message



Shelve and Disable Alarms When Necessary

Shelving

- Temporarily silencing an alarm

Disabling

- Stopping an alarm from being evaluated
Can be used for nuisance alarms



Responsiveness

Responsive Design

- Design responds to user context
- Design responds to screen size



Corso Demo



Corso Demo

#ICCElevate Build-a-Thon! - September 28th



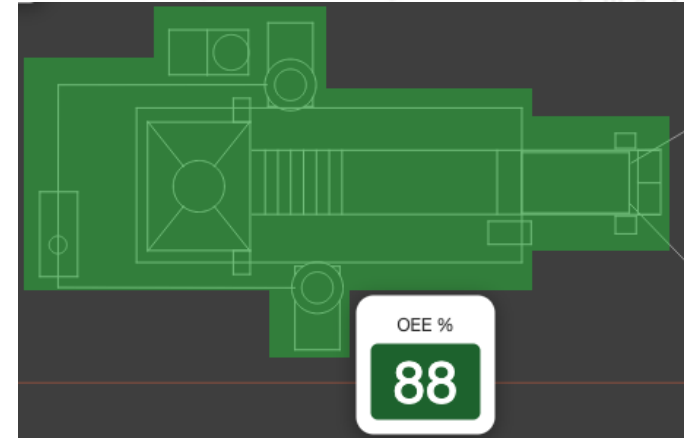
Focus on Each User's Needs (they're different)

- Business
- Operators
- Investors/Customers

Corso Demo

Business

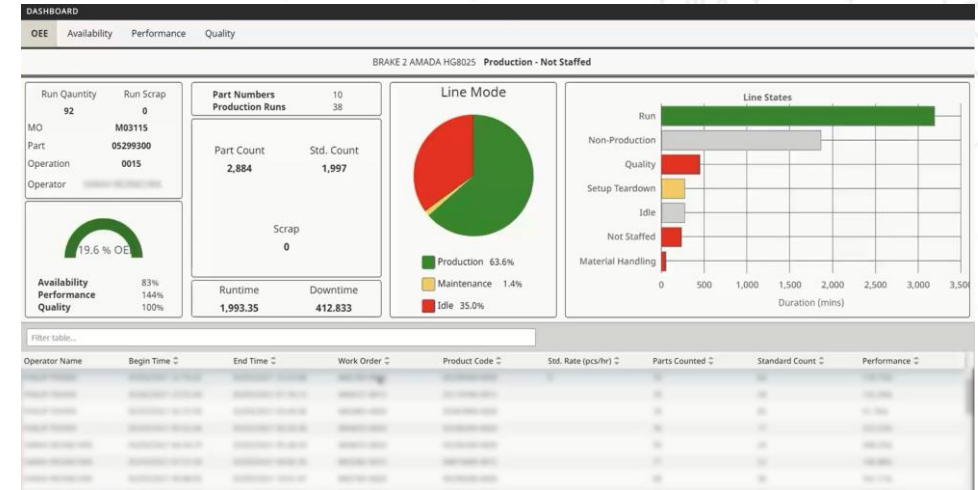
- Answer Questions Quickly
 - High Level KPIs
 - Where are resources being lost?
 - How do we stop the bleeding?
- Map Scale Views
- Larger Scale Context
 - Site/Area/Line



Corso Demo

Operators

- Run the process
 - How to run the process efficiently
 - Real-time KPIs
 - Alarms & Upsets
 - What's coming next? (Production Schedules)
- Map Views plus Workcell HMIs
- Localized Context
 - (maybe) Area, definitely Line/Cell

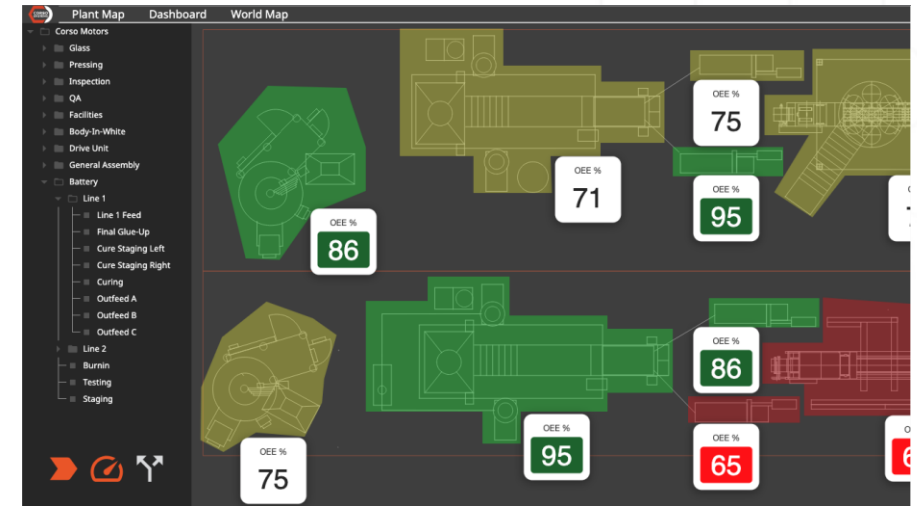


<https://icc.inductiveautomation.com/discover-gallery-detail/2021/corso-systems>

Corso Demo

Investors/Customers

- On a plant tour they will want to see:
 - High Level KPIs
 - Process Flow Diagrams
 - *What is that robot doing right now?*
- Map Scale Views and Line level HMIs
- Need to build context for them
- Looks matter more



Kupper Demo



Kupper Demo

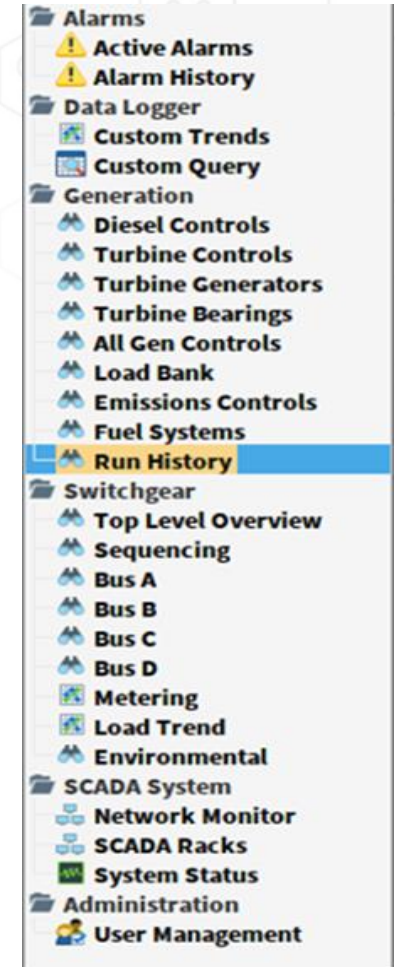
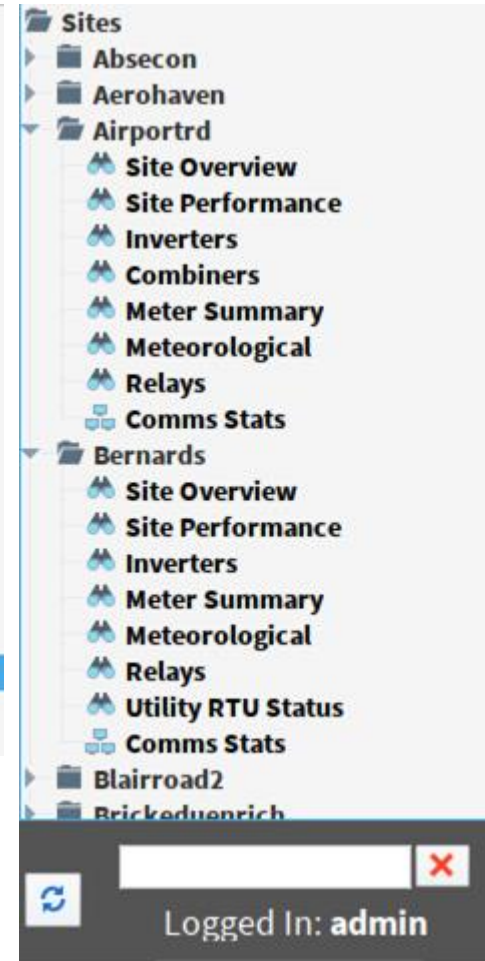
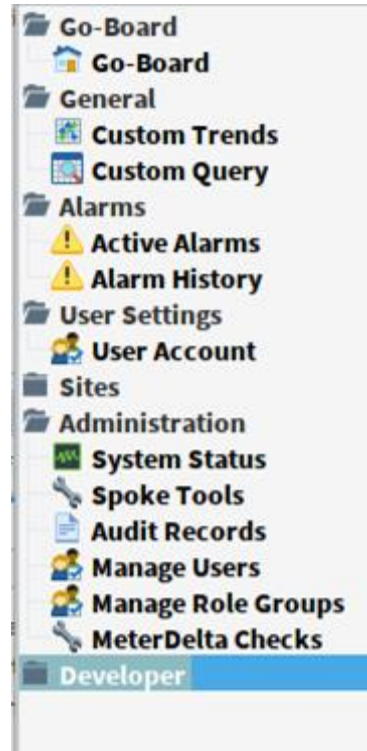
Practical Design Elements

- Organization
 - Hierarchical navigation, with all vital windows readily accessible. Avoid the situation where user is asking: “How did I get to that screen again?”
 - Data grouped by source device and into practical groupings for interaction.
- Data with Context
 - Pre-built trends and sparklines in addition to full-customizable trending.
 - Sparklines when useful.
 - Data Analysis
- Industry-Specific Features
 - Functionality created to augment the user’s workflows or to handle industry-specific challenges.

Kupper Demo

Organization - Navigation

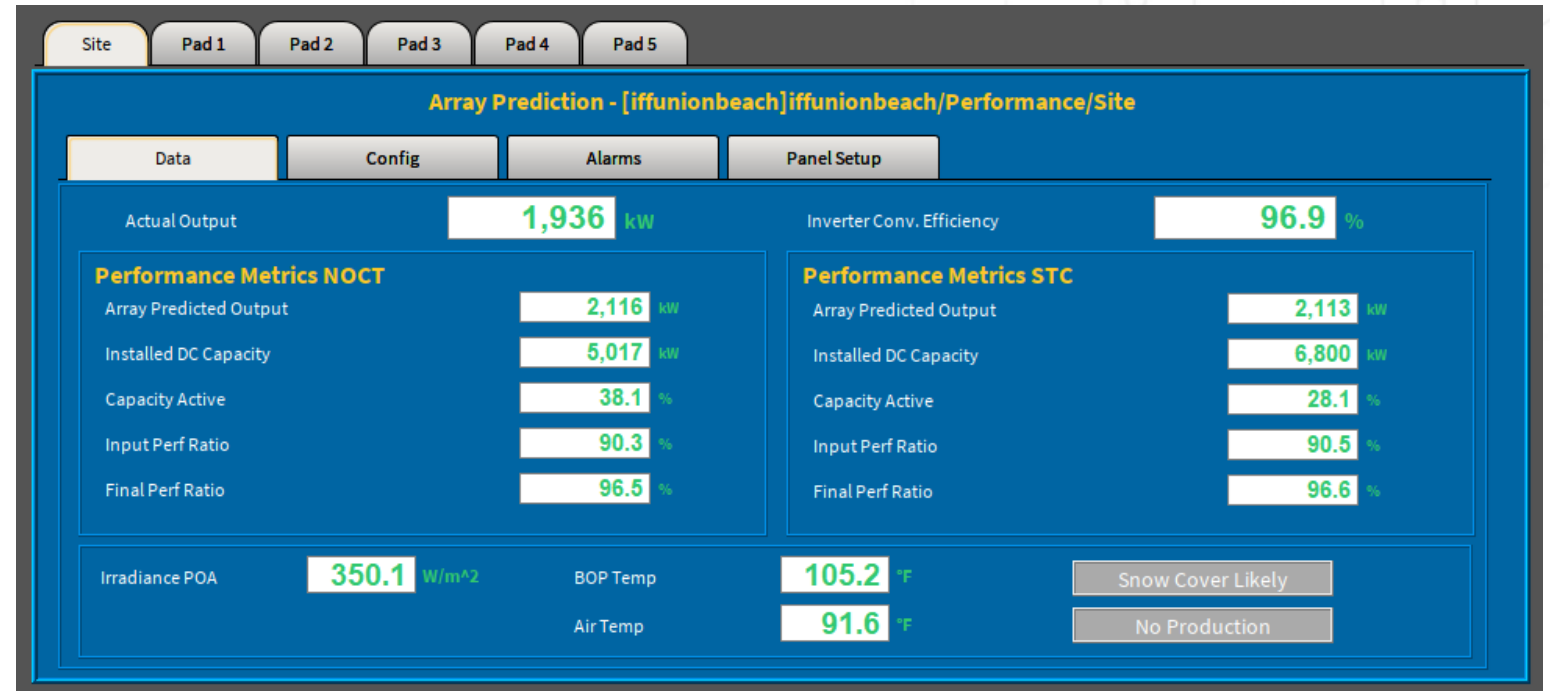
- Navigation Organized by task and system.
- Filterable/Searchable if a large number of options.
- All options shown, except those the user does not have permission for. User does not have to click around in different screens hoping to find the right button.
- On page change, the highlighted window updates to reflect current location.



Kupper Demo

Organization - Navigation

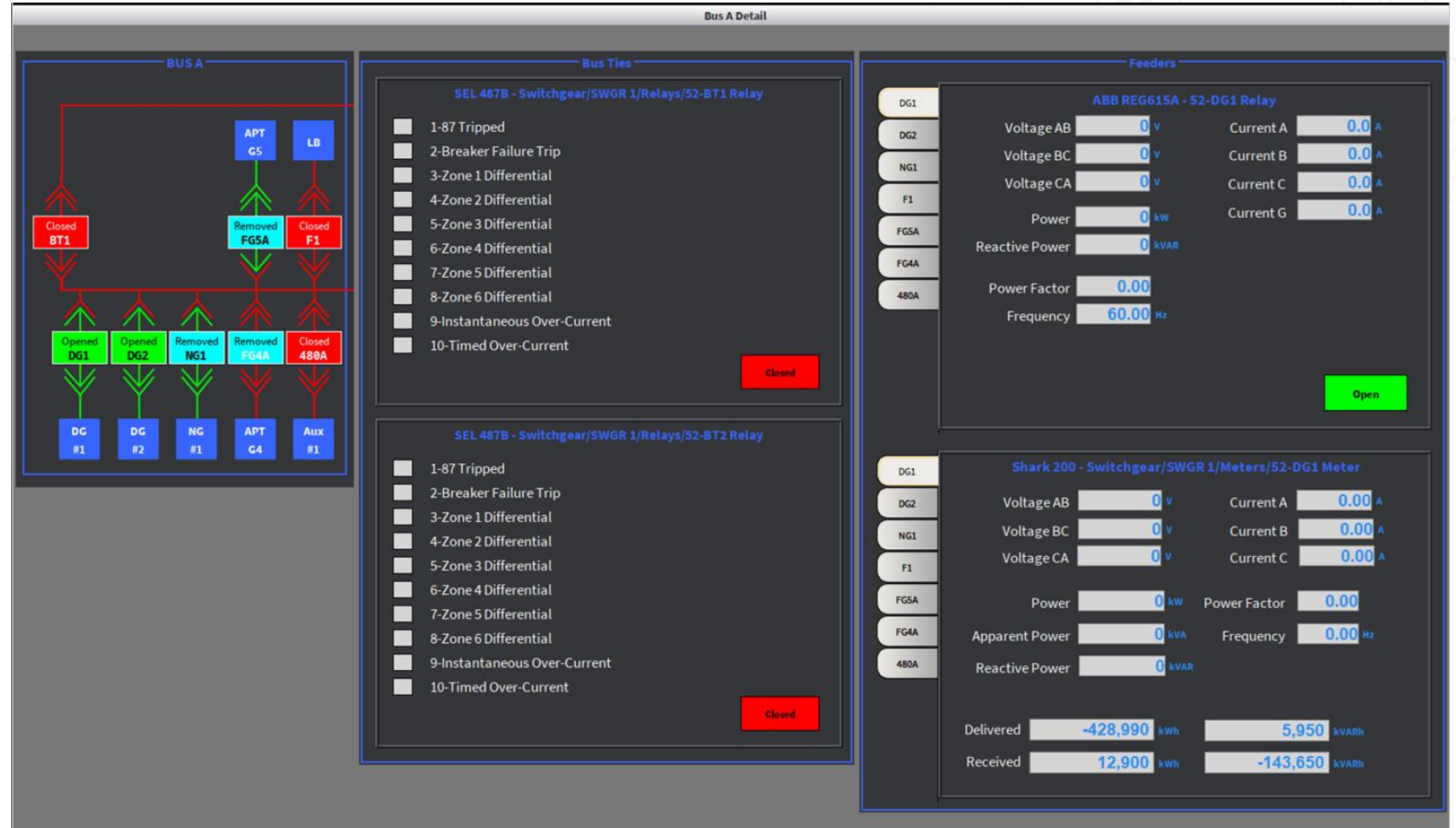
- Using a tabbed navigation to switch between similar devices can avoid a jarring window-change.
- Can also be used to indicate hierarchy or groupings of data.



Kupper Demo

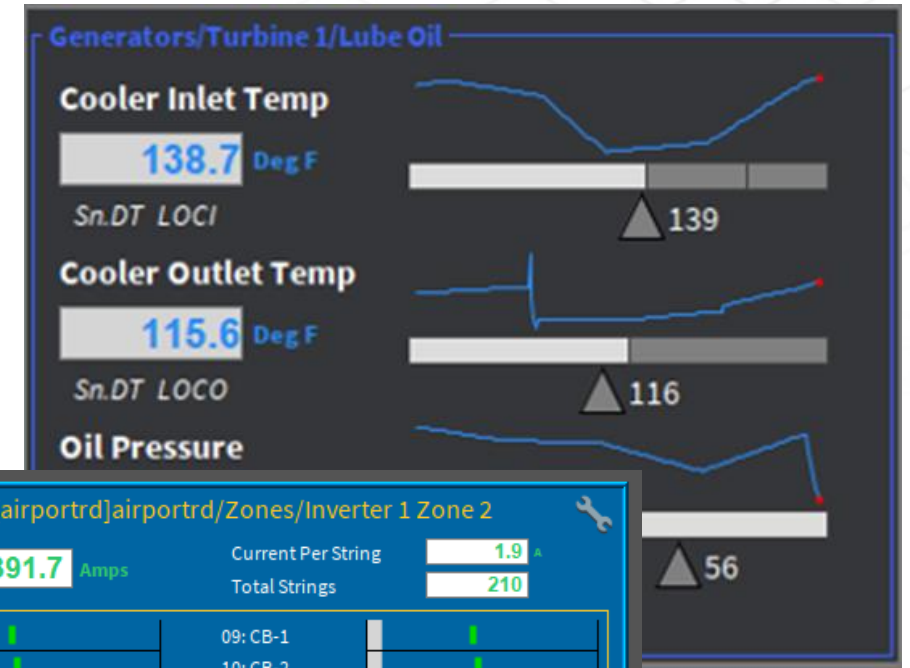
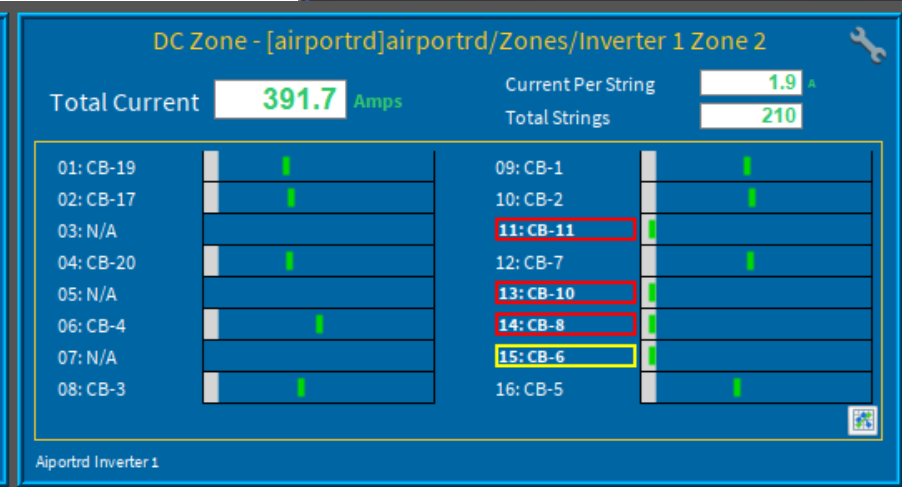
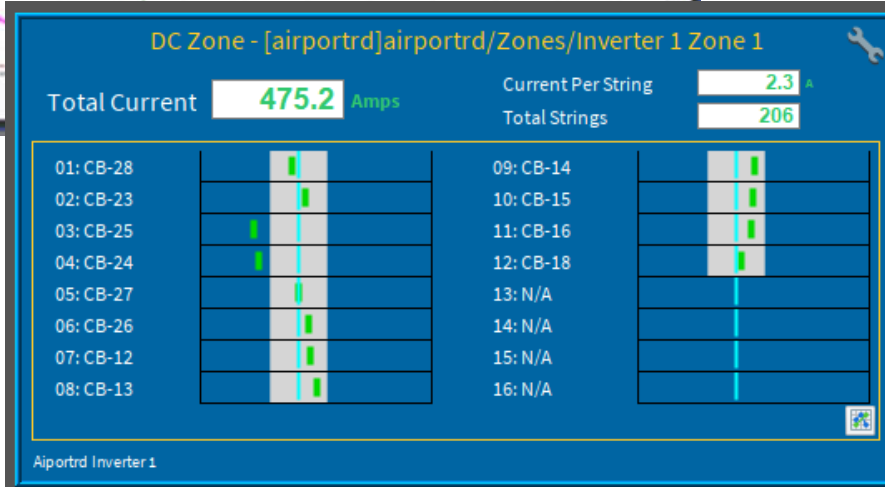
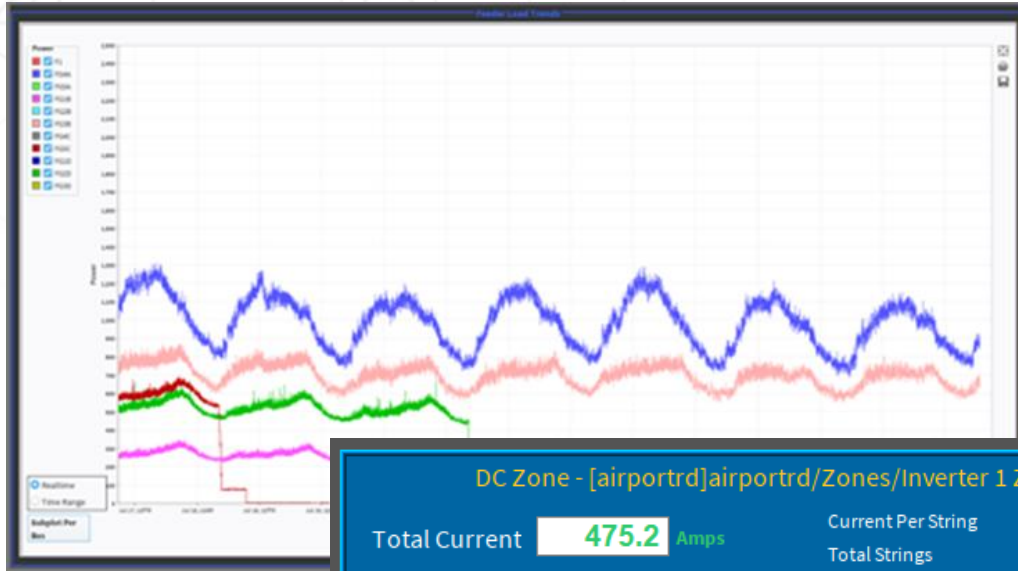
Organization – Data by Device And Area

- Visual Layout organizing the data.
- The three columns in this screen represent progressively deeper information.
 - Bus Overview
 - Inter-Bus Alarms
 - Intra-Bus Devices and their data.



Kupper Demo

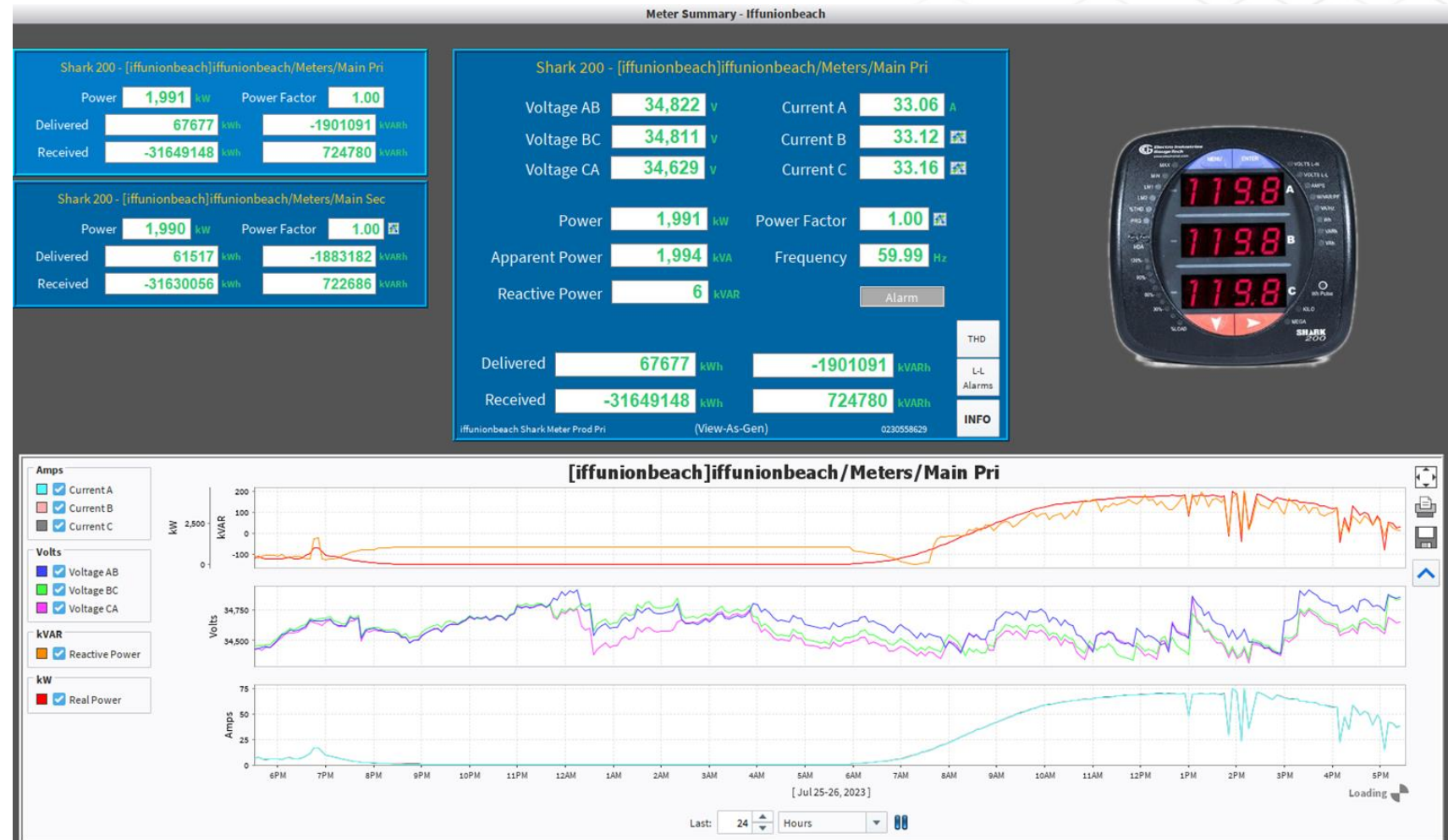
Data + Context = Information



Kupper Demo

Data + Context = Information

- Left Faceplates are preview of data and act as the selector. Highlighted faceplate is active.
- Central Faceplate shows full detail.
- Right Image shows the device as seen on site.
- Graph At Bottom for the selected device



Kupper Demo

Industry-Specific Features

Always-Visible KPI's



Engine Maintenance Records

The screenshot displays the 'Maintenance Tracking' software interface. It includes a 'Maintenance Item Status' table with columns for Item Name, Item Category, Tag Interval Elapsed, Tag Interval Remaining, Time (Hrs) Elapsed, and Time (Hrs) Remaining. Below this is a 'Search Filter' and a 'Maintenance Records For Selected Item' table. To the right, there are 'Maintenance Item Settings' and 'Maintenance Record Details' sections. The 'Maintenance Record Details' section shows a calendar for May 2022 and a 'Tag Value' of 41,868.

Sunrise/Sunset Based Alarm Suppression

The screenshot shows the 'Solar Alarm Suppressor Settings' window. It features a 'Solar Alarm Suppressor - [Aerohaven]/Aerohaven/SolarAlarmSuppressor' title bar. The main area has a blue background and contains several settings: 'Alarms On' (checked), 'Manually Suppress' (unchecked), 'Sunrise/Sunset Times' (with a 'Sun Is Up' button), 'Sunrise Offset (Minutes)' (45), 'Sunset Offset (Minutes)' (-30), 'Alarms On Time' (Jul 20, 2023, 6:33:00 AM), 'Alarms Off Time' (Jul 20, 2023, 7:53:00 PM), 'Latitude' (39.821228), 'Longitude' (-74.896980), 'Site Time' (Jul 20, 2023, 3:15:20 PM), 'Sunrise Time' (Jul 20, 2023, 5:48:00 AM), and 'Sunset Time' (Jul 20, 2023, 8:23:00 PM).

ACC Demo



ACC Demo

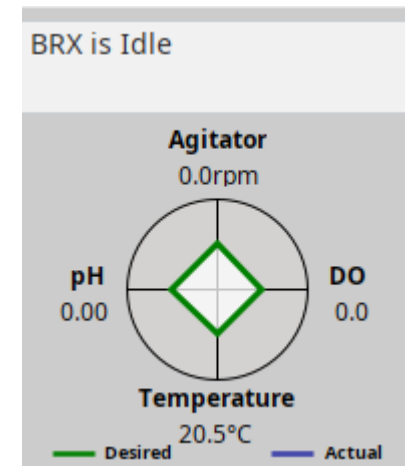
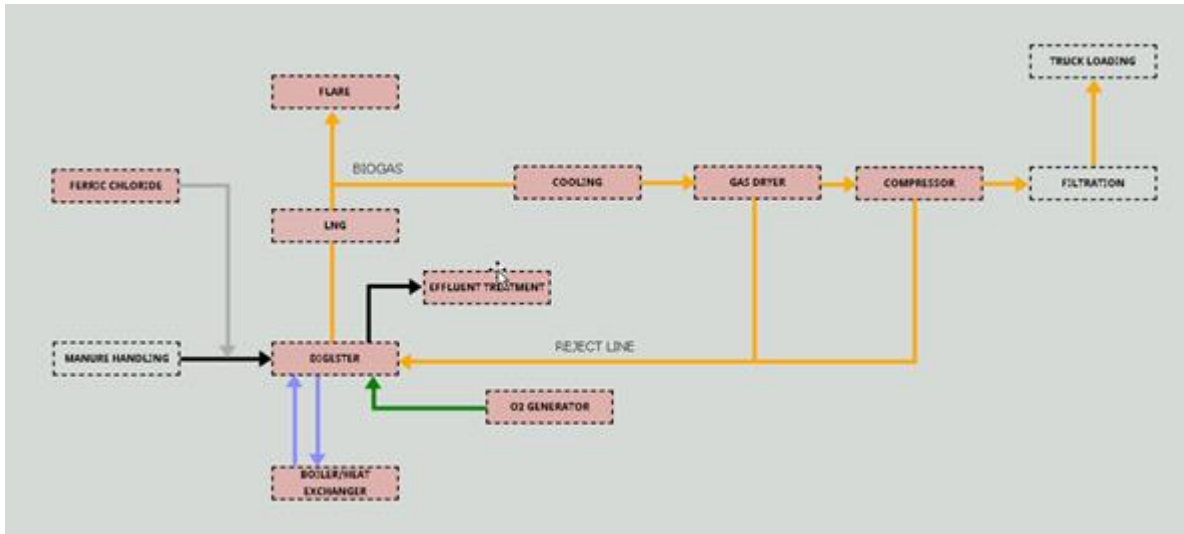
Practical Design Elements

- Design specific for the Process Industries
 - Follow the ISA 101 Standard Guidelines
 - Navigation can be simple, intuitive
 - Limit the use of color for attention
 - At a glance status of a process
 - Human Factors Engineering
 - Follow the ISA 88 Standard Guidelines
 - Modular, reusable elements (Graphics, UDT and Control Logic)

ACC Demo

Overview Display

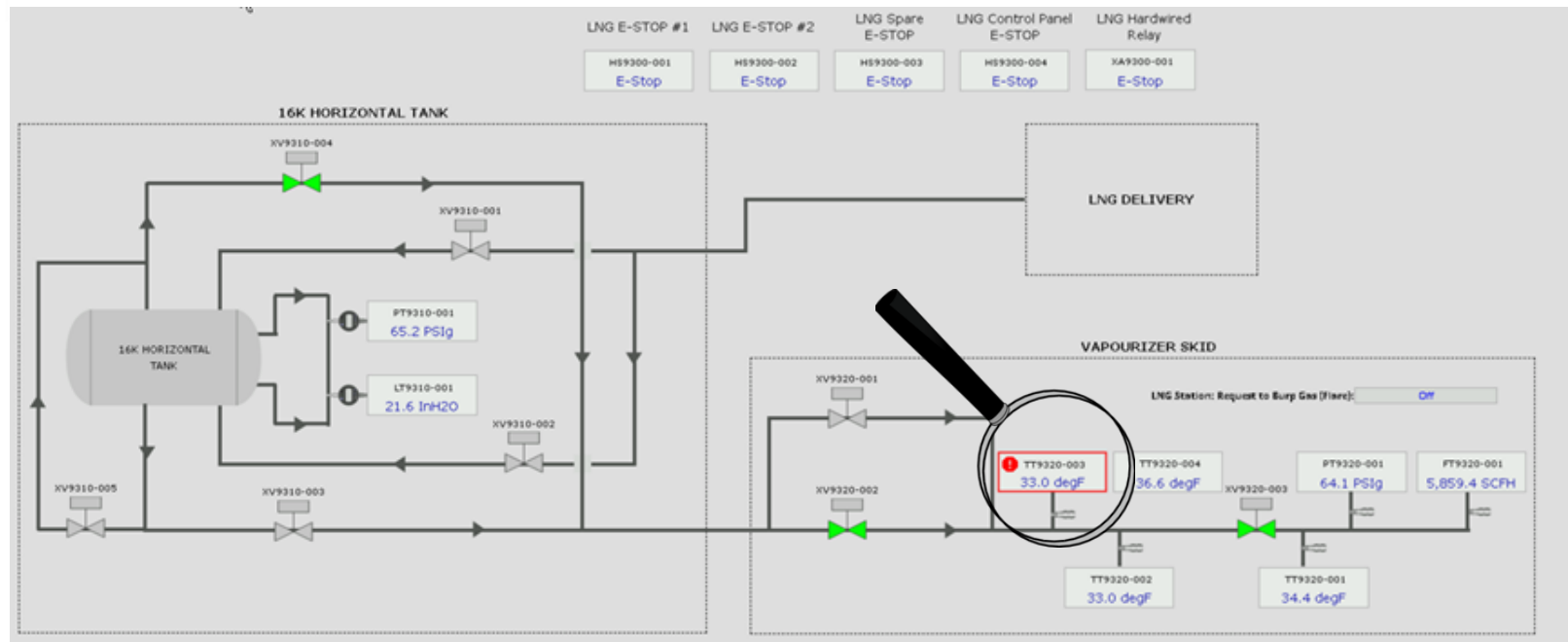
- At a glance process flow and status
- Situational Awareness



ACC Demo

Process Flow

- Simplified process diagrams
- Mobile format
- Shape and color indicate process exceptions



DATA FROM LNG	
LNG Station: Minimum Discharge Level:	3 INCH
LNG Station: Minimum Discharge Pressure:	20 PSig
LNG Station: Vaporizer Maximum Sheath Temperature:	250 deg F
LNG Station: Vaporizer Maximum Bundle Temperature:	225 deg F
LNG Station: Fill Process Maximum Fill Level:	35 %
LNG Station: Fill Process Top Fill Pressure:	45 psi
LNG Station: Fill Process Bottom Fill Pressure:	40 psi
LNG Station: Economizer On:	10
LNG Station: Economizer Off:	40
LNG Station: PBU On:	28
LNG Station: PBU Off:	45
LNG Station: Vaporizer Mode:	AUTO
LNG Station: Vaporizer Minimum Pressure:	OK
LNG Station: Vaporizer Minimum Flow:	OK
LNG Station: Vaporizer Desired Discharge Temperature:	Low Temp
Flare Faulted - LNG Station Burp Stopping:	Off
E Stop in EOP System - Shut Down LNG Station:	Off

ACC Demo

Intuitive Control

- Monitoring modular phase logic control
- Consistent Design
- Organizing each faceplate logically
- Process steps clearly described

Manure Xfer Phase - MH1110

Home Details Steps

Manure Transfer Phase:
MH1110_PH_MANURE_XFER

Step
State

Phase Time 00:00:00 State Time 00:00:00 Step Time 00:00:00

Permissives

☐ All Enabled Permissives Met Permissives

Manual Commands

Start Hold Abort Clear Failures

Parameters

Expected Daily Input SP: 0.0 gal

Max Flow Differential SP: 0.0 % (2-10)

High Manure Volume Warning SP: 0.0 % (100-105)

High Manure Volume Alarm SP: 0.0 % (103-110)

No Manure Flow Max Time SP: 0.0 sec (0-1000)

Message

Manure Xfer Phase - MH1110

Home Details Steps

Step	Description
300	Checking Permissives
410	Initialize
420	MHD and Digester Ready?
430	Digester Ready for Filling?
440	Digester Release Filling Pump?
450	Initiating Transfer
460	Transferring
470	Komro Faulted
480	High Digester Volume
490	No Flow Detected
500	Differential Flow Alarm
510	Influent Manure Flow Rate Mismatch
520	Waiting for flow to Digester

Industry-Specific HMIs

Compare & Contrast

- Overlap between industries
 - Navigation
 - Reusability
 - High Performance
 - Alarms
 - Responsiveness
- Design that differentiates



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*Ignition User Manual also available at:
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ELEVATE

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BUILD A THON

FINAL TWO



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VS



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